

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is respectfully requested.

Status of the Application

Claims 1, 3-4 and 6-13 were previously pending, and every claim was rejected.

Claims 2 and 5 were previously canceled.

Claim 1 has been amended to clarify that there may be more than one metal film and to correct a grammatical error. No new matter is added. The amendments to Claim 1 are supported by disclosures in Applicants' U.S. Patent Application Publication No. 2007/0215895 (hereinafter "Publication") including, but not limited to: ¶ 45 ("two metal layers 11, 12 provided on an upper surface"); and ¶ 12 ("a metal film . . . functioning as an electrode layer for mounting a semiconductor light-emitting element and/or a reflective layer for reflecting light from a semiconductor light-emitting element.")

Claims 1, 3-4 and 6-13 are pending for examination.

Rejections under 35 U.S.C. § 103

Claims 1, 3-4 and 7-13 are rejected under 35 U.S.C. § 103(a) as being obvious over Japanese Patent Application Publication No. JP-2002-127948 by Ishii et al. (hereinafter "Ishii"; U.S. Patent Application Publication No. 2005/0167679 is used as an English-language counterpart of JP-2002-127948). Claim 6 is rejected as being obvious over Ishii in view of U.S. Patent Application Publication No. 2002/0171087 by Krames et al. (hereinafter "Krames").

With respect to independent Claim 1, which is the only independent claim pending in the application, the Examiner acknowledges that Ishii does not explicitly state that the at least one metal film has: (1) crystal grains with particle diameters of no more than 0.5 microns; and (2) a center-line average roughness Ra of no more than 0.1 microns. *See* Office Action, p. 3, second to last paragraph. However, the Examiner contends that Paragraph 58 of Ishii discloses that the crystal grains of the substrate of Ishii meet these criteria. *Id.*, p. 3, last paragraph.

Contrary to the Examiner's contentions, Ishii does not disclose a metal film with the recited characteristics. Amended Claim 1 recites that the particle diameter of the crystal grains along a surface plane of the at least one metal film is no more than 0.5 microns. Ishii does not address the particle diameter of crystal grains at all. The cited section of Ishii merely states that the substrate of Ishii should have a surface roughness Ra of "at most 1 μm , more desirably at most 0.1 μm " and a "flatness of at most 5 μm , more desirably at most 1 μm ." *See* Ishii, ¶ 58. Neither of these lengthscales, i.e. "surface roughness" and "flatness," relate to the particle diameter of crystal grains along a surface of a metal film. Furthermore, nothing else in Ishii or Krames addresses the particle diameter. Therefore, neither Ishii nor Krames discloses, teaches or suggests the recited limitation of a metal film including crystal grains with a particle diameter of no more than 0.5 μm along a surface of the film.

Furthermore, Ishii does not disclose the recited limitation of a metal film with a center-line average roughness Ra of no more than 0.1 μm . Paragraph 58 of Ishii states that the substrate should have certain values for the average roughness Ra. The substrate 4 of Ishii, similar to the substrate of the present application, is a base layer that may be made of a ceramic, such as aluminum nitride, and on which metal layers may be applied. *See, e.g.*, Ishii, ¶¶ 48-64 and Figs. 1-6. The substrate 4 of Ishii is clearly not a "metal film" that is formed on a surface of a substrate; it is a base layer on which such metal films may be formed. Therefore, the cited section of Ishii does not disclose the recited limitation of a metal film with a center-line average roughness Ra of no more than 0.1 μm . Furthermore, nothing else in Ishii or Krames discloses, teaches or suggests this limitation.

The recited limitations of a metal film with a particle diameter along a surface plane thereof of no more than 0.5 μm and a center-line average roughness Ra of no more than 0.1 μm provide significant advantages over the prior art, including Ishii and Krames. The reflectivity of a metal film depends inversely on the surface particle diameter and center-line average roughness. *See, e.g.*, Publication, ¶ 22 ("larger crystal grain particle diameters along the surface plane tend to increase unevenness of the surface . . . greater surface roughness on the substrate tends to increase unevenness of the metal film surface . . . [a]s the unevenness of the metal film surface increases,

reflectivity decreases due to the tendency toward irregular reflection of light"); ¶¶ 53-55 and Figures 3A-3B (showing and explaining how decreasing the roughness and particle diameter increases reflectivity). Greater reflectivity in the metal film is desirable because it improves the light emission efficiency of the device. *Id.*, ¶ 3. Therefore, the particle diameter and center-line roughness characteristics that are recited in Claim 1, and which are not disclosed, suggested or taught in either Ishii or Krames, result in a device with superior light emission efficiency as compared to the devices of the prior art, including Ishii and Krames.

In view of the foregoing, neither Ishii nor Krames discloses the recited limitations of a metal film with a particle diameter along a surface plane thereof of no more than 0.5 μm and a center-line average roughness Ra of no more than 0.1 μm , and it would not have been obvious to one of ordinary skill in the art at the time of invention to modify Ishii or Krames to include these features. Therefore, Claim 1 is allowable over the cited references. Withdrawal of the rejection of this claim is respectfully requested.

Dependent Claims 3-4 and 6-13 all depend from independent base Claim 1. Therefore, all of these claims are in condition for allowance due at least to their dependence on an allowable base claim. Withdrawal of the rejections of these claims is respectfully requested.

CONCLUSION

Each and every point raised in the Office Action dated July 23, 2009 has been addressed on the basis of the above remarks. In view of the foregoing it is believed that claims 1, 3-4 and 6-13 are in condition for allowance and it is respectfully requested that the application be reconsidered and that all pending claims be allowed and the case passed to issue.

If there are any other issues remaining which the Examiner believes could be resolved through a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number indicated below.

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Respectfully submitted,

By

Louis J. DelJuidice

Registration No. 47,522

DARBY & DARBY P.C.

P.O. Box 770

Church Street Station

New York, New York 10008-0770

(212) 527-7700

(212) 527-7701 (Fax)

Attorneys/Agents For Applicant